Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of Recommendations Approved by 2019 World Radiocommunication Conference Advisory Committee	)))))	IB Docket No. 16-185

COMMENTS OF VIASAT, INC.

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COMMENTS OF VIASAT, INC.

Viasat, Inc. ("Viasat") provides the following comments in response to the Commission's October 3, 2018 Public Notice in the above-captioned proceeding.[1] Viasat is a member of the 2019 World Radiocommunication Conference Advisory Committee ("WAC"), and actively participated in the development of many of the proposals, views, and recommendations that are included in Attachment A to the *Public Notice*. Viasat submits these Comments to address particular aspects of the multi-view recommendations for proposals on Agenda Item 1.5 for the 2019 World Radiocommunication Conference ("WRC") that require elaboration, as well as to provide further elaboration on its continuing concerns about the "consultation meeting" approach that is included in the WAC's recommendation for proposals on WRC-19 Agenda Item 1.6. Agenda Item 1.5 is particularly critical because it addresses the mechanism for providing global regulatory certainty to support the provision of satellite-based connectivity to airplanes, ships and vehicles—including the thousands of commercial and government aircraft that rely on satellite-powered broadband today for in-flight connectivity.

[1] Public Notice, DA 18-1017, International Bureau Seeks Comment on Recommendations Approved by World Radiocommunication Conference Advisory Committee (released October 3, 2018) ("Public Notice").

I. SUMMARY

In the Comments below, Viasat offers the following views:

-- On WRC-19 Agenda Item 1.5, addressing regulatory and technical conditions for earth stations in motion ("ESIM") communicating with geostationary-satellite orbit ("GSO") fixed-satellite service ("FSS") networks in the 27.5-29.5 GHz (Earth-to-space) and 17.7-19.7 GHz (space-to-Earth) frequency bands:

1. Viasat explains that the View A mask has been adopted in Europe (in ECC Decision 13(01)) for the protection of both fixed and mobile systems with respect to aeronautical ESIM in the same bands, and should be agreed for the United States.

2. View B does not define core sharing, leaves compliance of power flux-density ("pfd") values to protect the mobile service to a country-by-country determination, and thus provides no certainty at all to ESIM operators.

3. The View B tuning-range argument is a false argument. The proposed means for protecting terrestrial service allows ESIM operations across the entire spectrum range identified for ESIMs.

4. View C is flatly inconsistent with the Commission's new Report and Order on ESIM use, which allows ESIM operations in the 29.1-29.5 GHz band segment, subject to coordination—an existing requirement that is not altered in any respect by View A.

In short, View A will protect the terrestrial services (including 5G mobile) and provide a stable environment for ESIM operations around the world, while View B is designed to exclude uses of the 27.5-29.5 GHz band for services other than terrestrial mobile service, and thus promotes inefficient spectrum use. The concerns raised in View C are already addressed by existing international coordination requirements.

-- On WRC-19 Agenda Item 1.6, addressing introduction of regulatory means for allowing multiple non-geostationary-satellite orbit ("non-GSO") FSS systems to operate at 50/40 GHz while protecting GSO FSS networks from unacceptable interference, Viasat reiterates its concerns that no effective mechanism has been proposed to ensure compliance with the proposed aggregate interference limit when more than three non-GSO FSS systems come into operation.

II. DISCUSSION

A. Agenda Item 1.5

Viasat fully and strongly supports the proposals for Agenda Item 1.5—on regulatory and technical conditions for earth stations in motion ("ESIM") communicating with geostationary-

satellite orbit ("GSO") fixed-satellite service ("FSS") networks in the 27.5-29.5 GHz (Earth-to-space) and 17.7-19.7 GHz (space-to-Earth) frequency bands—that are presented in View A of Document WAC/068, as included in Attachment A to the *Public Notice*.

As the world's leading provider of ESIM service to aircraft, Viasat has been an active proponent of the studies in the International Telecommunication Union ("ITU") under this agenda item, and is a principal developer of the complete set of proposals in View A.

The View A proposals are consistent with the example regulatory text in the draft CPM Report, as developed by Working Party 4A (which had the ITU-R lead in studies on Agenda Item 1.5), provide a comprehensive mechanism for assuring the successful operation of ESIM around the world while ensuring protection of all existing users of the 27.5-29.5 GHz and 17.7-19.7 GHz bands, and provide valuable guidance to administrations seeking to implement ESIM. Importantly, the View A proposals provide for the introduction of ESIM into the 27.5-29.5 GHz and 17.7-19.7 GHz bands without disturbing in any way the operational capability of incumbent services, such as mobile services operating or planned for operation anywhere in the 27.5-29.5 GHz band—including mobile broadband services in the 27.5-28.35 GHz band in the United States.

View A and View B provide for specific technical measures in Annex 2 to the Draft New Resolution [AI15] for the protection of terrestrial fixed and mobile services from both maritime ESIM and aeronautical ESIM.[2] View A also includes a provision—inexplicably absent from View B—that specifies that any maritime or aeronautical ESIM that complies with the technical

[2] In the case of maritime ESIM, the restrictions in Annex 2 in View A include a minimum distance of 60 km from the low-water mark as officially recognized by the coastal State beyond which maritime ESIM can operate without the prior agreement of any administration, and a maximum maritime ESIM e.i.r.p. spectral density towards the territory of any coastal State of 24.44 dBW in a reference bandwidth of 14 MHz. The minimum distance is repeated without change or challenge in View B, but the maximun e.i.r.p. spectral density value is changed to 12.98 dBW in a reference bandwidth of 1 MHz. In the case of aeronautical ESIM, View A and View B include different pfd masks for the protection of terrestrial services, as discussed below.

limitations in Annex 2 is deemed to have met its obligation under the Resolution not to cause unacceptable interference to stations in terrestrial services.[3] Land ESIM (such as ESIM on trains and motor vehicles) are not subject to technical limitations in the draft resolution. As these ESIM will transmit primarily on the territory of an administration and only present concerns in an area near the country's borders with neighboring administrations, they are subject to a general obligation not to cause interference to terrestrial systems without values in Annex 2, and to the guidelines for administrations in Annex 3 to Draft New Resolution [AI15].[4]

1. The View A PFD Mask Protects Both the Fixed Service and Mobile Service

In its draft regulatory CPM text for protection of the mobile service in the 27.5-29.5 GHz band, Working Party 4A provided two options for a pfd mask from aeronautical ESIM. The first, which is captured in View A in Doc. WAC/068, comes from ECC Decision 13(01), as adopted in Europe for the protection of fixed and mobile service operations in the 27.5-29.5 GHz band specifically from aeronautical ESIM emissions.[5] The second mask in the draft CPM text would protect broadband mobile service systems with the characteristics put into Working Party 5A by the United States, but is more stringent than the View A/Option 1 pfd mask, due in large part to the overconservative use of a single protection criterion and the failure to take the dynamic nature of aeronautical ESIM operations into consideration. Other factors, such as

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[3] Document WAC/068, View A, at Draft New Resolution [AI15], *resolves* 1.2.5.

[4] Viasat expects that the ITU-R will provide a recommendation or report that specifies a methodology for determining how close a land ESIM can maneuver to the border of a neighboring administration without posing a risk of interference. Studies on this subject are already under way in ITU-R Working Party 4A, and Working Parties 5A and 5C (on the mobile and fixed services, respectively) are being consulted in this effort.

[5] According to the Draft CEPT Brief on Agenda Item 1.5, ECC Decision (13)01, the harmonised use, free circulation and exemption from individual licensing of Earth Stations on Mobile Platforms (ESOMPs) within the frequency bands 17.3-20.2 GHz and 27.5-30.0 GHz, "gives the necessary conditions to allow ESIM operation in the band 17.3-20.2 GHz and 27.5-30.0 GHz within Europe. These conditions are based on ECC Report 184 and have been confirmed for both Fixed and Mobile Services . . . ." Draft CEPT Brief on WRC-19 Agenda item 1.5, Doc. PTB(18)077, Annex IV-05 (7th CPG19 PTB Meeting, Sept. 2018), at Section 3.

disagreements over the amount of fuselage attenuation to be considered also contribute to the differences.

2. The Commission Should Reject View B as it Does Not Promote Harmonious Use of the Spectrum Around the World

Viasat urges the Commission to adopt the View A pfd mask into the draft U.S. proposal for Agenda Item 1.5 that it brings into reconciliation with the Federal side for submission to the CITEL PCC.II meeting in December 2018. Both the View A and View B masks protect mobile service from unacceptable interference, but the overprotection and overly conservative and erroneous assumptions that go into the View B pfd mask, such as failing to use the relevant mobile service characteristics specified in the ITU-R study process—namely, -10 degree base station antenna downtilt and electrical beam forming limits of -3 degree below the horizon as the maximum elevation angle. Thus, the View B mask unnecessarily impairs the ability of aeronautical ESIM to operate in the 27.5-29.5 GHz band.

In its final pre-CPM liaison statement to Working Party 4A in June 2018, Working Party 5A provided a formula for deriving a pfd mask to protect an IMT/5G-like mobile system, but indicated that clearly suggested that any pfd mask derived using that formula could be overly conservative. Specifically, Working Party 5A noted that the formula used a single protection criterion (and thus failed to provide any separate consideration of long-term and short-term interference, as is typical when considering interference with respect to mobile systems).[6] In the case of mobile systems, permissible short-term interference levels are typically higher than the long-term or any 100%-of-the-time level. In addition, Working Party 5A noted that "there are elements of aeronautical ESIM operation (*e.g.*, the dynamic nature of the A-ESIM interference

[6] Doc. 4A/703, at 1 (1 June 2018).

caused) that might be appropriate to be taken into account when looking at the sharing environment."[7]

In addition, View B would completely remove *resolves* 1.2.5 from the Draft Resolution [AI15]. This resolves in View A (and in the draft CPM text) states that "any transmitting aeronautical or maritime ESIM that conforms to the requirements in Annex 2 to this Resolution shall be deemed to have met its obligation to terrestrial stations under *resolves* 1.2.2 above." The resolves thus provides that aeronautical ESIMs that protect mobile systems under the pfd mask in Annex 2 have a safe harbor in terms of ensuring that no unacceptable interference is caused to mobile systems. Removal of this resolves would mean that ESIM operators that protect mobile service to the required level in the mask could still face assertions of causing unacceptable interference; it would effectively render them secondary, and represent an unnecessary imbalance in spectrum rights. This is illogical and untenable from the ESIM point of view. The View B proponents do not explain their deviation from CPM text or their proposed creation of continuing uncertainty for ESIM operations, and the Commission should reject the deletion.

In other words, View A will protect the 5G mobile service and provide a stable environment for ESIM operations around the world, while View B is designed to exclude uses of the band for services other than terrestrial mobile service, and thus promotes inefficient spectrum use.

3. The View B Proponents' Tuning-Range Argument Is Misplaced; There Is No Equivalency Between the ESIM Situation at 28 GHz and the IMT/5G Situation at 40-42 GHz

Finally, Viasat urges the Commission to reject the attempt by View B proponents to equate a proposal for ESIM across the 27.5-29.5 GHz band with the flawed "tuning range"

[7] *Id.*

argument the same proponents have tried to use to justify a mobile broadband identification under Agenda Item 1.13 in the 40-42 GHz band, which the Commission has designated for exclusive use by ubiquitously deployed FSS user terminal downlinks. There is no equivalency. At 28 GHz, studies confirm that with a pfd mask, mobile service will be protected from aeronautical ESIM. It is this protection of other services in the band that justifies identification of the entire two gigahertz of uplink spectrum for ESIM use (which will be authorized on a country-by-country basis under Resolution [AI15] conditions). At 40-42 GHz, however, mobile broadband operators have not shown that they can operate compatibly with ubiquitous FSS user terminals. No protection for FSS operations from mobile broadband has been proposed that is similar to the pfd mask that ESIM operators have developed to protect the mobile broadband systems at issue. Without such a protection mechanism, there is no way that the 40-42 GHz band can be identified for 5G/IMT use without contravening the Commission's decision in the second decision in the *Spectrum Frontiers* proceeding to ensure an environment in which ubiquitous FSS user terminals can operate in that spectrum.

ESIM operators have thus done at 28 GHz what 5G/IMT operators have failed to do at 40-42 GHz: ensure compatibility with other services in the same spectrum. The View B proponents' attempts to equate the ESIM proposal for two gigahertz at 27.5-29.5 GHz with the flawed mobile broadband argument for "tuning range" access at 40-42 GHz under Agenda Item 1.13 must be rejected. There simply is no good reason to limit ESIM operations to a portion of the 27.5-29.5 GHz band.

4. The View C Proposal is Inconsistent with the Commission's Recent Report and Order on Earth Stations in Motion, and Should Be Rejected

The proponent of View C in Doc. WAC/068 seeks to restrict the spectrum available for ESIM use in the 27.5-29.5 GHz band—and inexplicably, in the 17.7-19.7 GHz downlink band—

in order to protect non-GSO MSS feeder link operations from unacceptable interference. The proponent also seeks a pfd mask and other regulatory protections as part of its view.

All of Viasat's studies have shown that there is no unacceptable interference from ESIM into non-GSO MSS feeder links in the 29.1-29.5 GHz band—even when aeronautical ESIM are flown over one of the few feeder link earth stations around the world. Viasat proposes instead to address any lingering concerns through intersystem coordination under the procedures of Article 9 of the ITU Radio Regulations (and under Section 25.258(a) of the Commission's rules).[8]

In its new Report and Order on ESIM use, the Commission addressed this same issue and found "that coordination under Section 25.258(a) will provide Iridium with sufficient interference protection."[9] Without going into detail here, the Commission's action in IB Docket No. 17-95 resolves the question over View C against the proponent. The decision applies to the entirety of the 29.1-29.5 GHz band in terms of the proposal in View A, because the coordination provisions of Article 9 of the ITU Radio Regulations—in particular, No. 9.11A—apply to the entire 400 MHz.

No. 9.11A applies to the 400 MHz of the downlink non-GSO MSS feeder link band at 19.3-19.7 GHz as well, so no different result is warranted there. Viasat is at a loss to understand why any downlink band limitation was proposed in View C, as the GSO FSS downlink signal emitted from the FSS space station is exactly the same for ESIM and conventional FSS earth stations.

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[8] 47 C.F.R. § 25.258(a).

[9] *Amendment of Parts 2 and 25 of the Commission's Rules to Facilitate the Use of Earth Stations in Motion Communicating with Geostationary Orbit Space Stations in Frequency Bands Allocated to the Fixed Satellite Service, Report and Order and Further Notice of Proposed Rulemaking in IB Docket No 17-95*, FCC 18-138, at 17 (¶ 56).

B. Agenda Item 1.6

The proposal for WRC-19 Agenda Item 1.6 that was developed by the WAC in Document WAC/069 in Attachment A to the *Public Notice* came through without a formal alternative view. Nevertheless, Viasat had expressed concerns at the informal working group level about the ability of the "consultation meeting" mechanism in the proposed Draft New Resolution [A16] to ensure adequate protection of GSO FSS networks from aggregate emissions once more than three non-GSO FSS systems meeting the single-entry limit enter operation,[10] and writes here to reiterate those concerns.

In its Report and Order and Further Notice of Proposed Rulemaking regarding non-GSO FSS systems,[11] the Commission reinforced the general obligation of non-GSO FSS systems to ensure protection of GSO FSS networks, stating: "[w]e will require NGSO FSS licensees to comply with existing aggregate EPFD limits . . ., and may intervene if operators cannot agree

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[10] Viasat's concern is documented in the Minutes of the 17th Meeting of IWG-3. *See* Document IWG-3/058R1, at Section 5(b). The minutes contain the following statement:

> "Viasat is concerned that the "consultation meeting" approach being proposed with respect to the aggregate non-GSO limit will not be effective as a practical matter. Namely, there will be no mandatory means of containing non-GSO emissions within the aggregate limit once more than three non-GSO systems deploy. The first three non-GSO systems in operation will operate at the single entry level of up to 3% each. When systems 4 and 5 come online, the 10% limit would likely be exceeded unless the first three systems scale back their operations so that they do not exceed a single entry limit of much less than 3% (e.g., approximately 2% on a pro rata basis). Under the current proposal, the only way aggregate emissions from all of those systems actually would be reduced would be with the mutual agreement of all of the operators of the non-GSO systems, who have no commercial incentive to scale back their operating systems to accommodate their NGSO competitors or protect their GSO competitors. Absent those competitors reaching such an agreement, the aggregate emissions of the multiple non-GSO systems could well exceed the aggregate 10% limit, resulting in an impermissible level of harm to GSO systems. There would be no requirement that any non-GSO system alter its operations in this case, and therefore no effective remedy for a GSO system that suffers interference. Notably, the BR would have no active role is this process. Unless and until a suitable mechanism is developed, such as a mandatory pro rata reduction in individual non-GSO system emissions, implemented by the BR and the licensing administrations of each non-GSO system, Viasat does not believe that it is appropriate to change No. 22.2. Under the proposal being considered, GSO networks would bear the operational and commercial risk and uncertainty associated with changing the current Radio Regulations in the favor on non-GSO systems."

[11] *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters,* Report and Order and Further Notice of Proposed Rulemaking in IB Docket No 16-408, FCC 17-122, at 13 (¶¶ 35 and 39) (2017).

among themselves how to ensure the aggregate limits are met."[12] In other words, the Commission indicated it would use its oversight to ensure adequate protection of GSO FSS networks from the aggregate effects on all non-GSO FSS systems brought into operation. Although the Commission *Non-GSO R&O* addressed bands below 30 GHz, the principle on No. 22.2 of the ITU Radio Regulations and protection of GSO FSS networks from aggregate non-GSO FSS emissions applies in the 50/40 GHz bands.

For the protection of GSO FSS networks from unacceptable interference as required by No. 22.2 of the ITU Radio Regulations, the Agenda Item 1.6 proposal in Doc. WAC/069 contains limits for a per-system limit of 3% for unavailability for GSO networks, and a 10% aggregate limit. The proposal also includes a consultation-meeting approach under which non-GSO FSS operators assess the aggregate interference levels on a regular (*e.g.*, annual) basis and collectively take measures to ensure that the aggregate limit is never exceeded. With a per-system limit of 3%, this becomes a concern for the GSO FSS operators when there are more than three non-GSO FSS systems operating at the maximum levels on a co-frequency basis.

Under the consultation-meeting approach, the only way aggregate emissions from all of those non-GSO FSS systems actually would be reduced would be with the mutual agreement of all of the operators of the non-GSO systems, who lack any commercial incentive to scale back their operating systems to accommodate their non-GSO competitors or protect their GSO competitors. In the absence of an agreement, the aggregate emissions of the multiple non-GSO systems could well exceed the aggregate 10% limit, resulting in an impermissible level of harm to GSO networks. The failed experience with relying on annual agreements on L-band operators in Region 2 highlights the risk of relying on commercial negotiations of competitors who have

[12] *Id.*

no reason to help their competitors. Notably, no role is provided for any national regulator or the ITU to ensure compliance with the aggregate limit.

Viasat maintains that the proposal in Resolution [AI16], as written in Doc. WAC/069, does not address how the non-GSO FSS aggregate limit will be enforced, or otherwise provide any assurance that the aggregate limit will not be exceeded when more than three non-GSO FSS systems come into operation. The limits and resolution are supposed to quantify the obligation of non-GSO FSS systems not to cause unacceptable interference to GSO FSS networks operating co-frequency. In the absence of some additional measure being included in Resolution [AI16]—such as a mandatory *pro rata* reduction in the per-system limit in the event of non-agreement at a consultation meeting once more than three non-GSO FSS systems are operational, or even a limit on the number of operational non-GSO FSS systems to three or four—the burden of meeting No. 22.2 (which remains in place under the proposal) would impermissibly shift from the non-GSO operator to the GSO network operators.

To be sure, some mechanism must be added to Resolution [AI16] to ensure that the consultation meeting approach never leads to a situation where a commercial disagreement (or failure even to meet) results in the aggregate limit being exceeded by operational non-GSO FSS systems. Right now, the draft resolution simply fails to address what happens in that case, and who steps in to resolve the issue.

III. CONCLUSION

For the foregoing reasons, Viasat respectfully urges the Commission to adopt the proposals in View A for Agenda Item 1.5, and to reject the proposals in Views B and C. Doing so will protect the 5G mobile service and provide a stable environment for ESIM operations around the world and across the entire 27.5-29.5 GHz uplink range that is essential for ESIM operations.

For Agenda Item 1.6, Viasat respectfully urges the Commission to take steps to shore up the "consultation meeting" approach to ensure that GSO FSS networks in the 50/40 GHz FSS bands are protected from aggregate non-GSO FSS emissions when more than three non-GSO FSS systems enter operation. Viasat is concerned that nothing in the mechanism as drafted in Doc. WAC/069 actually ensures that non-GSO FSS systems would provide the required level of aggregate protection to GSO FSS networks, and nothing even provides for suitable regulatory oversight of the matter.

Respectfully submitted,

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